

TWO NEW SPECIES OF *ISCHNOCHITON* (MOLLUSCA: POLYPLACOPHORA) IN THE WESTERN CENTRAL ATLANTIC

*Antonio J. Ferreira*¹

ABSTRACT

Two new species of *Ischnochiton* from the tropical western Atlantic, one from Florida and one from Panama, are described. A diagnostic key to the species of *Ischnochiton* in the region is given. Photographs of *Ischnochiton hartmeyeri* Thiele, 1910, are published here for the first time.

The genus *Ischnochiton* Gray, 1847a, is particularly well represented in the western central Atlantic. Examination of the chiton collection of the Indian River Coastal Zone Museum (IRCZM), Harbor Branch Foundation Inc., Fort Pierce, Florida, graciously made available by P. M. Mikkelsen, and a collecting trip along the eastern shores of Panama in February 1975 resulted in the finding of two new species of chitons here allocated to the genus. Towards a more comprehensive view of the genus *Ischnochiton* in the tropical eastern Atlantic, further attention was given to congeneric material in the collections of the California Academy of Sciences (CAS), San Francisco, California, U.S. National Museum of Natural History (USNM), Washington, D.C., Los Angeles County Museum of Natural History (LACM), Los Angeles, California, and in my own collection (AJF collecting station numbers on file at CAS and LACM).

Class POLYPLACOPHORA Gray, 1821

Order NEOLORICATA Bergenhayn, 1955

Suborder ISCHNOCHITONINA Bergenhayn, 1930

Family Ischnochitonidae Dall, 1889

Genus *Ischnochiton* Gray, 1847a

Type Species.—*Chiton textilis* (Gray, 1828) by subsequent designation (Gray, 1847b).

***Ischnochiton niveus* new species**

Figures 1-4

Type Material and Type Locality.—Holotype (CAS 059843) and paratypes (CAS 059844; USNM 859002; A.J.F. private collection) from Garden Key, Florida (24°38'N, 82°52'W), at 1 m, on under-surface of rocks on sand, collected by me, 5 May 1975; paratypes (IRCZM 61:040) from Bethal Shoals, Florida (27°43'N, 80°10.5'W) at 9-15 m.

Diagnosis.—Small chitons (up to 6 mm long), all white, carinate; lateral areas hardly raised, with microgranules in quincunx; central areas with minute pits also in quincunx. Girdle scales striated. Radula with tricuspid major lateral teeth.

Description.—Holotype, largest specimen from Garden Key lot (AJF 234), preserved flat in alcohol, 5.5 mm long, 3.0 mm wide (including girdle), width/length 0.55; valves carinate, not beaked. Shell and girdle uniformly white, except for few small, dark brown dots on posterior edge of valves i-vi. Central areas with

¹ We were notified of Dr. Ferreira's death on May 19, 1986, by his widow. Inquiries and requests for his scientific work should be directed to the California Academy of Sciences, Department of Invertebrate Zoology and Geology, Golden Gate Park, San Francisco 94118.

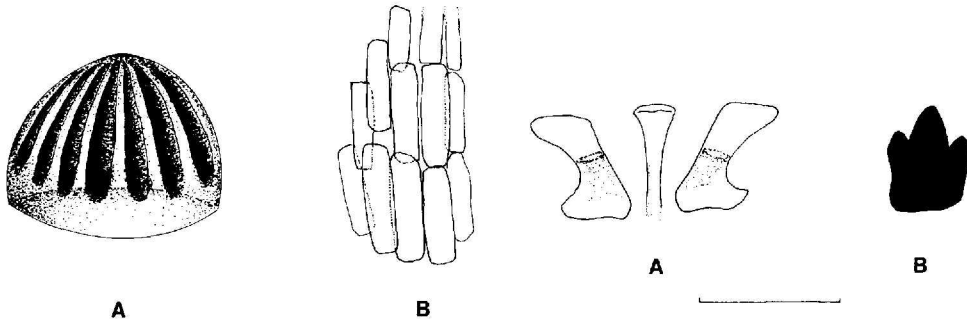


Figure 1. *Ischnochiton niveus* new species. Holotype: A. Scale of dorsal surface of girdle. B. Scales of ventral surface of girdle. Scale bar, 100 μ m.

Figure 2. *Ischnochiton niveus* new species. Holotype: A. Median and first lateral teeth of radula. B. Head of major lateral tooth.

minute, quincunxially arranged pits throughout. Lateral areas weakly raised, with round granules, and about 50 μ m in diameter, close together in quincunx; similar sculpture on valve i and postmucro area of valve viii. Mucro somewhat anterior, slightly pointed; postmucro area concave. Gills holobranchial, with 15 plumes per side. Articulamentum white; sutural laminae subrectangular, relatively short; sinus wide, shallow; on valve viii, relative width of sinus (width of sinus/width of sutural laminae) 0.9. Insertion teeth sharp; slit formula 10-1-8. Girdle dorsal surface with imbricated scales, up to 85 μ m long, with 8 striations defining 8 ribs (Fig. 1A); girdle ventral surface paved with transparent, rectangular scales, 40 $\times$ 10 μ m, arranged in columns (Fig. 1B). Radula 1.6 mm long (29% of specimen length), comprising 30 rows of mature teeth; median teeth 13 μ m wide at anterior blade, narrowing sharply posteriorly; first lateral teeth about 35 μ m long (Fig. 2A); head of major lateral teeth tricuspid, 30 μ m wide (Fig. 2B); spatulate teeth 35 μ m wide at spatula; outer marginal teeth 45 $\times$ 25 μ m (length/width, 1.8).

Paratypes (Figs. 3 and 4) very similar to holotype; uniformly white (dried specimens darken and become yellow) except for few dark brown dots on posterior edge of valve i in one specimen, on posterior edge of valves i-vi in another. Specimens from Bethal Shoals, Florida, 6.6 $\times$ 4.0 mm, 6.5 $\times$ 3.8 mm, and ca. 6

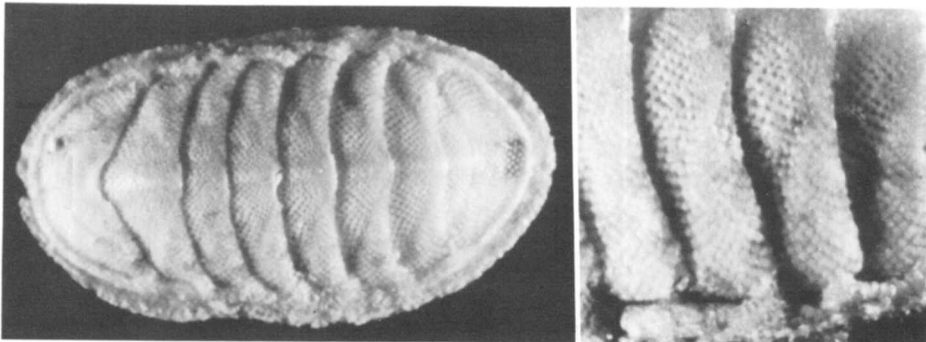


Figure 3. *Ischnochiton niveus* new species. Paratype (A.J.F. private collection): dorsal view.

Figure 4. *Ischnochiton niveus* new species. Paratype (A.J.F. private collection): close-up of lateral and pleural areas.

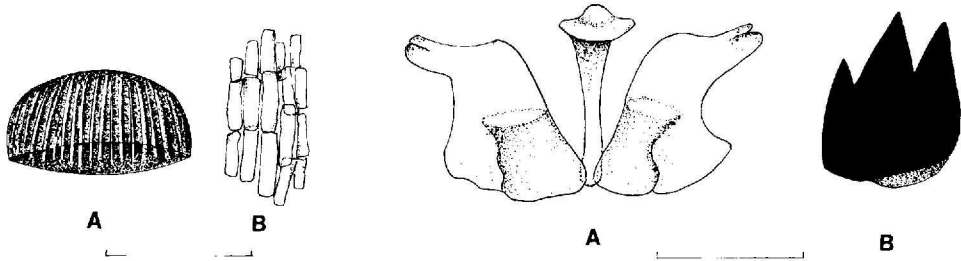


Figure 5. *Ischnochiton kaasi* new species. Holotype: A. Scale of girdle dorsal surface. B. Scales of girdle ventral surface. Scale bar, 100 μ m.

Figure 6. *Ischnochiton kaasi* new species. Holotype: A. Median and first lateral teeth of radula. B. Head of major lateral tooth. Scale bar, 100 μ m.

mm long (disarticulated; slit formula 8-1-7); specimens from Garden Key, Florida, 4.9×2.9 mm, 4.7×2.7 mm, 4.4×2.4 mm. Specimens width/length mean 0.58 (N = 6, including holotype).

Distribution.—*Ischnochiton niveus* is known only from Garden Key, Florida at 1 m, and Bethal Shoals, Florida, at 9–15 m.

Remarks.—The species is here named *niveus* for the snow-white color of the specimens.

Ischnochiton kaasi new species

Figures 5–8

Type Material and Type Locality.—Holotype (CAS 059840) and paratypes (CAS 059839; P. Kaas private collection; A.J.F. private collection) from Bocas del Toro, Panama ($9^{\circ}22'N$, $83^{\circ}14'W$), at 0.5–3 m, collected by A. J. and N. J. Ferreira, 10 Feb. 1975; paratypes (LACM 2107) from 3 km W of Portobelo, Panama, collected by J. H. McLean and A. Mullen, 13 Mar. 1970; paratypes (A. J. Ferreira private collection) from 1 km W of Portobelo, Panama ($9^{\circ}33'N$, $79^{\circ}39'W$), collected by A. J. and N. J. Ferreira, 15 Feb. 1975.

Diagnosis.—Relatively small chitons (up to 13 mm long), round-backed, elongate; tegmental sculpture inconspicuous, with pits in quincunx on central areas, giving

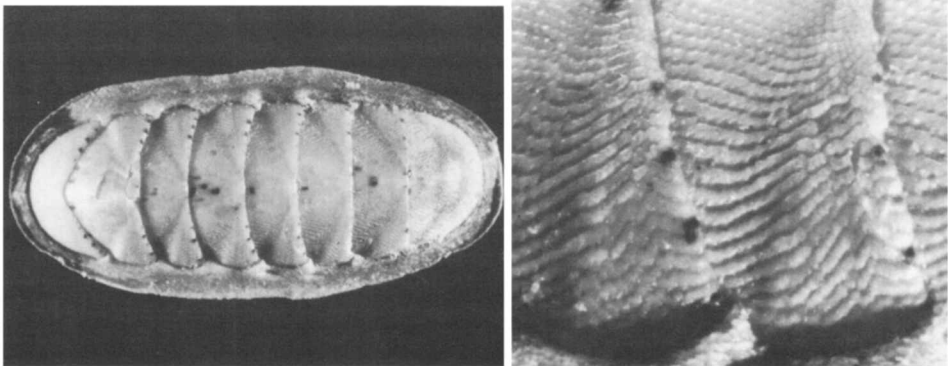


Figure 7. *Ischnochiton kaasi* new species. Paratype (A.J.F. private collection): dorsal view.

Figure 8. *Ischnochiton kaasi* new species. Paratype (A.J.F. private collection): close-up of lateral and pleural areas.

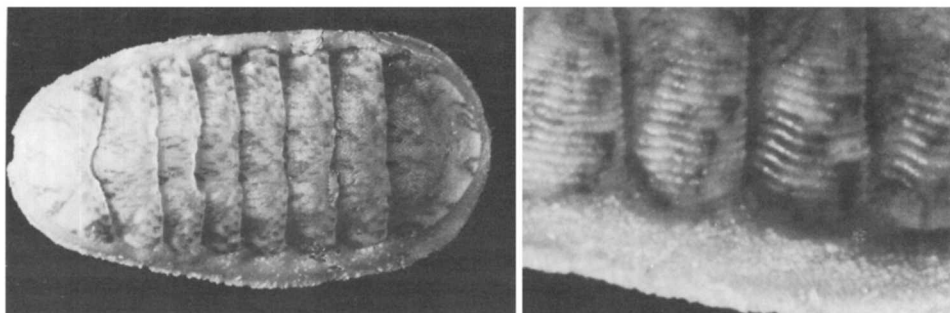


Figure 9. *Ischnochiton hartmeyeri* Thiele, 1910. Specimen 6 mm long (AJF 247: Cape Santa Maria, Long Island, Bahamas): dorsal view.

Figure 10. *Ischnochiton hartmeyeri* Thiele, 1910. Specimen 6 mm long (AJF 247: Cape Santa Maria, Long Island, Bahamas): close-up of lateral and pleural areas.

way to minute granular riblets on pleural areas which continue upon lateral areas usually making a chevron figure near sutural edge; mucro central; sutural laminae short, sinus wide; girdle with imbricated, small, striate scales; radula major lateral teeth with tricuspid head.

Description.—Holotype, round-backed, high-arched valves, 13.7 mm long, 4.9 mm wide (including girdle); dark brown on sides, with wide yellowish stripe along jugal area. Tegmental sculpture inconspicuous: central areas with minute pits in quincunx giving way to granular longitudinal riblets at pleural areas which cross diagonal line to continue upon lateral areas, changing direction in chevron figure near sutural edge. Anterior valve and postmucro area of posterior valve with similar, concentric riblets. Ratio of length (measured along articulamental side) of valves i/viii, 0.77; ratio of tegmental width of valves i/viii, 1.0. Lateral areas weakly defined, hardly elevated. Mucro central, well formed; postmucro area somewhat concave. Articulamentum bluish on the sides (corresponding to dark brown areas in tegmentum), pale yellow otherwise. Sutural laminae rather short, subtriangular to subrectangular posteriorly; posterior valve somewhat inflated; sinus wide; relative width of sinus on valve viii, 1.1. Insertion teeth sharp, well defined; slit formula 9-1-9; eaves solid. Girdle banded; upper surface covered with imbricated scales, up to 110 μm long, with 17–20 striations (Fig. 5A); undersurface with transparent, rectangular scales, $40 \times 10 \mu\text{m}$, arranged in columns (Fig. 5B). Radula 5 mm long (36% of specimen length), comprising 40 rows of mature teeth; median teeth (Fig. 6A) 40 μm wide at anterior blade, narrowing sharply posteriorly; first lateral teeth rather wide, 100 μm long, with bifid protuberance at anterior lateral corner; major lateral teeth with tricuspid head (Fig. 6B), 95 μm wide; spatulate teeth 55 μm wide at spatula; outer marginal teeth rather pentagonal, 80 μm long, 75 μm wide (length/width, 1.1).

Paratypes (Figs. 7 and 8) very similar to holotype; largest 15.0 mm long (AJF 216); smallest, 7.0 mm long (LACM 2107); width/length, mean 0.48 (SD = 0.02; N = 7, including holotype).

Distribution.—*Ischnochiton kaasi* is known only from Bocas del Toro, Panama, and two localities 1–3 km west of Portobelo, Panama at depths of 0.5 to 3 m.

Remarks.—*Ischnochiton kaasi* may be easily confused with the sympatric *I. erythronotus* (Adams, 1845) and *I. striolatus* (Gray, 1828); these species are similar

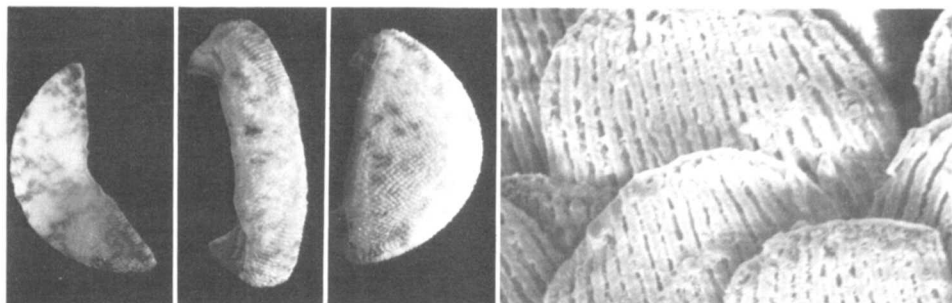


Figure 11. *Ischnochiton hartmeyeri* Thiele, 1910. Specimen 6.5 mm long (AJF 247: Cape Santa Maria, Long Island, Bahamas): dorsal view of anterior, intermediate, and posterior valves.

Figure 12. *Ischnochiton hartmeyeri* Thiele, 1910. Specimen 5.5 mm long (AJF 247: Cape Santa Maria, Long Island, Bahamas): SEM micrograph of dorsal girdle scales ($\times 1,860$) [courtesy of Dr. H. Bertsch, San Diego, California].

in color, size, general shape, and habitat, although they differ in tegmental sculpture and girdle scales.

The assignment of *kaasi* to *Ischnochiton* is somewhat tentative; its narrow body, somewhat elongate posterior valve, wide sinus, and small striated girdle scales suggest allocation to *Stenoplax* Carpenter *in* Dall, 1879. However, Pilsbry (1892), Smith (1960), and Van Belle (1983) defined *Stenoplax* as possessing not only the features mentioned above but also a low-arched, depressed tail valve, with sub-central, inconspicuous mucro, and elongate sutural laminae. These latter characters are not present in *I. kaasi*.

The species is named *kaasi* after Piet Kaas, Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands, whose many contributions to the taxonomy of chitons have been a continued source of inspiration.

DISCUSSION

The finding of *Ischnochiton niveus* and *I. kaasi* brings to eight the number of *Ischnochiton* species recognized in the western central Atlantic; *Ischnochiton striolatus* (Gray, 1828), *I. erythronotus* (Adams, 1845), *I. pseudovirgatus* Kaas, 1972, and *I. bromleyi* Ferreira, 1985, have been treated elsewhere (Ferreira, 1985).

Ischnochiton hartmeyeri Thiele, 1910, described from Bird Key Reef, Dry Tortugas, Florida, is widely distributed in the western central Atlantic. It has been here recognized from San Salvador Id., Bahamas (24°00'N; 74°30'W) (AJF 439), to Guataquaz Id., Angra dos Reis, RJ, Brasil (23°00'S, 44°18'W) (AJF 664); and at Jamaica (AJF 256), Cayman Islands (AJF 422), Curacao (AJF 258; AJF 260; AJF 262), Glover Reef, Belize (CAS 034778), Virgin Islands (AJF 322; AJF 325), and Salt Id., British Virgin Islands (18°22'N, 64°31'W) (AJF 298), easternmost record. Bathymetric range, 1–2 m (AJF 324: Garden Key, Dry Tortugas, Florida) to 36 m (Righi, 1971: off Lagoas, Brasil). Largest specimen examined, 7.2 mm long (AJF 298: Salt Id., British Virgin Islands, on the wreck of the RHONE). Photographs of the species (Figs. 9–12) appear here for the first time.

Ischnochiton dilatoculptus Kaas, 1982, described from off Fort Lauderdale, Florida, at 12 m, has been here recognized off Wabasso, Florida (27°46.2'N, 79°58.4'W) (ICRZM 61:074), northernmost record; Western Dry Rocks, off Key West (AJF 235); Bahamas, at San Salvador Id. (AJF 441) and Cape Santa Maria, Long Id. (AJF 247); Glover Reef, Belize (16°47'N, 87°45'W) (CAS 012752); and

British Virgin Islands, at Cockroach Id. (AJF 295), Salt Id. (AJF 298), and George Dog Id. (18°29'N, 64°28'W) (AJF 296), easternmost record. Bathymetric range, 1 m (CAS: Glover Reef, Belize) to 21–68 m (IRCZM 61:074). Largest specimen, 15 mm long (AJF 298: Salt Id., British Virgin Islands).

Ischnochiton boogii (Haddon, 1886), a species present in both western Atlantic and eastern Pacific, has been allocated to *Stenoplax* (Ferreira, 1985).

DIAGNOSTIC KEY OF SPECIES OF *ISCHNOCHITON* IN THE WESTERN CENTRAL ATLANTIC

- 1a. Girdle scales larger than 100 μ m long 2
- 1b. Girdle scales smaller than 100 μ m long 4
- 2a. Body width/length ratio larger than 0.5 *I. striolatus*
- 2b. Body width/length ratio smaller than 0.5 3
- 3a. Tegmentum with strong sculpture (riblets), without blue dots *I. erythronotus*
- 3b. Tegmentum with inconspicuous sculpture, often with blue dots *I. pseudovirgatus*
- 4a. Tegmental sculpture granular 5
- 4b. Tegmental sculpture nearly smooth 7
- 5a. Tegmentum white *I. niveus*
- 5b. Tegmentum roseate to brown 6
- 6a. Specimens very small (largest known, 4.3 mm long), orange to brown, valves strongly carinate, sutural laminae continuous across shallow sinus (? endemic to Barbados) *I. bromleyi*
- 6b. Specimens up to 15 mm long, light roseate to gray, valves subcarinate, sutural laminae well separate *I. dilatoscultus*
- 7a. Tegmentum dull, radula with tricuspid major lateral teeth *I. kaasi*
- 7b. Tegmentum polished, radula with unicuspid major lateral teeth *I. hartmeyer*

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ADDRESS: *Research Associate, Department of Invertebrate Zoology, California Academy of Sciences, Golden Gate Park, San Francisco, California 94118. For reprints: 2060 Clarmar Way, San Jose, California 95128.*